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ABSTRACT

A study examined whether intercollegiate debating enhances the critical thinking ability of participants and investigated whether users of the two existing styles--National Debate Tournament (NDT) and Cross Examination Debate Association (CEDA)--differed significantly from each other and from nondebaters in their critical thinking skills. Four null hypotheses guided the study: (1) there is no significant difference between CEDA and NDT debaters' scores on the critical thinking appraisal; (2) there is no significant difference in critical thinking scores between schools participating in different styles of debate; (3) there is no significant difference between the scores of CEDA debaters and nondebaters; and (4) there is no significant difference between the scores of NDT debaters and nondebaters. Participants at eight colleges and universities, two of which used exclusively the CEDA style, two the NDT style, and four of which used both, completed the Watson Glaser Critical Thinking Appraisal (WGCTA) test. Pretest and posttest scores were taken for debaters and control groups of nondebaters. Results indicated that debaters who used either style outscored nondebaters on the WGCTA, and that NDT debaters outscored CEDA debaters, but that this outcome may be unreliable due to a larger NDT sample size. (References and two tables are included.) (JC)

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THE EFFECTS OF CEDA AND NDT DEBATE TRAINING ON CRITICAL THINKING ABILITY

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The Effects of CEDA and NDT Debate Training on Critical Thinking Ability

Training in debate has long been considered a vital part of the educational process. Yet, in this time of financial stress, many forensic directors are asked to justify program expenditures. (Colbert and Biggers, 1985 p. 237). One frequent justification for debate is its contribution to the participants' critical thinking ability. Trank (1977) observes, "The process of invention, investigation, analysis, reasoning, organization, and critical thinking are common to each of these modes. They are some of the critical skills forensics educators have been teaching for years" (p. 4-5). In 1978, Trank stressed the importance of critical thinking stating:

> [I]f forensics education is an educationally justifiable activity it belongs within the academic curriculum. . . . By teaching argumentation and critical thinking in the academic curriculum we can also attempt to solve some of the problems that have given rise to the 'back to basics' movement. It would also allow us to put the debate tournament in its proper perspective as one necessary and valuable extension of classroom instruction (p. 6).

In a broader sense, critical thinking is not only a goal of debate training, but is a goal of higher education. Annis and Annis (1979), Fritz and Weaver (1984), and Katula and Martin (1984) acknowledge the importance of higher education's role in teaching their students critical thinking skills. Since the late 1940's many institutions of higher learning have responded to their goal by supporting debate programs.

Previous research suggests a relationship between debate participation and increases in critical thinking test scores (Howell, 1943; Brembeck, 1947; Williams, 1951; Beckman, 1955; Jackson, 1961; and Cross, 1971). However, these studies were reported prior to the emergence of the CEDA style of debate. An investigation of CEDA debate's relationship to the development of critical thinking would be

valuable to educators who wish to justify these debate programs.

The present study investigates the question of whether contemporary intercollegiate debate significantly increases the critical thinking scores of participants? In order to make statistical comparisons consistent with previous research, this study uses similiar conceptual definitions, research designs, instrumentation, and experimental treatment.

Watson and Glaser's (1980) definition of critical thinking is both narrow and specific enough to permit operationalization of the term for the purposes of this study. According to Watson and Glaser the ability to think critically involves "a composite of attitudes, knowledge, and skills":

> This composite includes: (1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true; (2) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and (3) skills in employing and applying the above attitudes and knowledge (p. 1).

Their conceptual framework offers the most comprehensive approach to operationalizing the phenomena that has become know as critical thinking. The reliability of the Watson Glaser Critical Thinking Appraisal (WGCTA) is adequate (Crites, 1965; Helmstader, 1965; Hovland, 1970; Annis and Annis, 1979; Watson and Glaser, 1980; and Keyser & Sweetland, 1985). Both content validity (Hill, 1970; Watson and Glaser, 1980; and Helmstader, 1983) and construct validity (Sorenson, 1966; Fogg and Calia, 1967; Agne and Blick; 1972; Burns, 1974; Smith, 1977; Annis and Annis, 1979; and Wilson and Wagner, 1981) have strong support.

H_1 : There is no significant difference between the scores on the critical thinking appraisal between CEDA and NDT debaters.

H_2 : There is no significant difference between the scores on the critical thinking appraisal between CEDA and NDT debaters.

H_3 : There is no significant difference between the scores on the critical thinking appraisal between CEDA and nondebaters.

H_4 : There is no significant difference between the scores on the critical thinking appraisal between NDT debaters and nondebaters.

The first null hypothesis investigates whether any style of debate enhances critical thinking. A recent analysis of previous research questioned the relationship between debate and critical thinking.

> The result of five studies of the relationship between debate training and critical thinking were examined to determine if in fact debate training improves critical thinking skills. . . . Meta analysis. . . indicated that the results could be accounted for by chance. The results of this analysis cast substancial doubt on the claimed relationship between debate training and critical thinking skill improvement. (Follert and Colbert, 1983 p. 1)

The second null hypothesis tests whether significant difference in critical thinking scores between students at schools participating in debate are related to the style of debate, specifically CEDA and NDT.

The third and fourth null hypotheses test whether CEDA debaters out gain nondebaters and whether NDT debaters out gain nondebaters. If the first null hypothesis (debater critical thinking scores are equal to nondebater critical thinking scores) is rejected then it is important to discover if the practices of CEDA or NDT were equally responsible for the rejection. If CEDA and NDT create different norms of behavior and these create differences in critical thinking scores, then such behavioral differences should be further investigated. Additionally, if all three groups significantly differ, the rank order for CEDA, NDT, and nondebate groups should be established.

DESIGN/METHODS

This study used a pretest-posttest control group design (Campbell & Stanley, 1963). In this format only the experimental group receives a treatment, hence one infers that the treatment is responsible for differences in dependent measures between the experimental and control groups. Although this design has its limitations, it is consistent with those employed by other studies of debate-critical thinking and was judged as appropriate for this type research.

Control groups were selected from volunteers from each institution where experimental groups (debaters) were located. The controls were generally comprised of undergraduate college students and 130 were confirmed as students in speech-communication courses. The control group were subjects with no previous debate experience and did not participate in debate activities during the experimental period.

The eight institutions participating in this research represented a reasonable cross section of universities participating in debate. The Florida State University (CEDA), The University of Miami (CEDA), Auburn University (NDT), and The University of Houston (CEDA & NDT) are all fairly large institutions (17,000 to 44,000). Emory University (CEDA & NDT), Mercer University (NDT), and Valdosta State College (CEDA & NDT) are smaller institutions (5,000 to 8,000). Four of the institutions are economically supported by their states and three institutions are privately supported. Four different states are represented and all are located in the southeast except of The University of Houston, which is located in the southwest.

Each participating debate coach at the above institutions was mailed the WGCTA Forms A and B, a copy of the testing administration instructions from the WGCTA Test Manual, and sheets. Coaches were

instructed to pretest the experimental and control groups two weeks before debate competition began and within two weeks after debate competition had concluded. The pretest answer sheets were returned by mail after each institution administered the tests; the posttest answer sheets were mailed to participating schools approximately three weeks before the completion of the debate season. No participating coach was given the correct answers, or scores on the WGCTA during the experimental period. All of the tests returned to be tabulated were complete and the total number of correct answers constituted the total raw score. Descriptive statistics were tabulated to measure the means, mean differences, standard deviations, and confidence intervals for the CEDA, NDT, and nondebater groups. This information permitted comparisons of the data to the normal distribution. Since it was not possible to randomly assign subjects to experimental and control groups, an analysis of covariance (using the pretest the covariate) was employed to test for differences between nondebaters, CEDA, and NDT debaters.

The intent of similar previous research was to study debate participants over time, outside the laboratory, and as the activity actually occurs. Given these circumstances, small effect size may be all one could expect to detect. Cohen (1969) defines a small effect size as d = .2 of a standard deviation (p. 24). A small effect size may be justified in some instances for this type of research because it involves non-laboratory data collection of intact groups of subjects with varying degrees of previous exposure to the experimental treatment; however, the literature suggests a debate-critical thinking relationship. If debate instructors ask their students to devote a great

amount of time, research, work, and effort in an activity like debate, an effect size greater than .2 of a standard deviation or 1.99 mean gain difference on an eighty item measuring instrument seems warranted. A moderate (.5 sd) to a large (.8 sd) effect size was determined as the baseline. If educators are to argue that specific debate training methods substantially increases critical thinking ability, they must have a result with sufficient power. Given the very small effect size of previous debate-critical thinking research, the statistical power of the test used were not very large.

The sample size estimate in this study should be considered conservative. The minimum adequate sample size was estimated to be 99.4 or approximately 100. 285 pretest answer sheets and 248 posttest answer sheets were obtained. This number exceeds the minimum sample size estimate and should be considered adequate.

Since the focus of this study was the difference (d) between groups (debaters vs. nondebaters and CEDA vs. NDT), the comparisons were similar to a single sample hypothesis testing situations of d=0 (Brewer, 1984 p. 5-15).

RESULTS

Table 1 lists the means and standard diviations of the entire sample analyzed in this study. The participants included 145 males and 130 females. The mean score on the WGCTA pretest was 55.51 and 53.65 on the posttest. The average mean difference between the pretest and the posttest was -1.86. The nondebaters averaged 52.67 on the WGCTA pretest, 49.14 on the posttest. There was a negative mean difference of -3.53 between the pretest and posttest. CEDA and NDT debaters combined scored a mean of 61.18 on the WGCTA pretest, 64.53 on the posttest, and a mean difference between the pretest and posttest of 3.06. CEDA

debaters averaged 62.67 on the pretest, 63.53 on the posttest, and a mean difference of .87. NDT debaters averaged 63.49 on the pretest, 67.91 on the posttest, and a mean difference of 4.22.

Do Debaters Outperform Nondebaters?

The results of an analysis of covariance testing the first hypothesis are reported in Table 2. The independent measure coded "debater/nondebater" consisted of those who debated or did not debate during the experimental period for the purpose of intercollegiate debate competition. Previous debate training and experience were statistically controlled for by removing a major source of nuisance variation by using the pretest as the covariate. In addition, no one who indicated having any type of debate training or experience was used in the control group. The source of variation for the main effects produced an F value of 28.21 which was significant at the .001 level. Thus, once the effects of the pretest are removed, the sum of the mean squares between debaters and nondebaters are significantly different; hence null hypothesis one is rejected.

The first hypothesis suggested no significant difference exists between debaters and nondebaters on the critical thinking appraisal. The descriptive analysis revealed the control group scored 52.67 on the pretest, and 49.14 on the posttest, and scored a pretest-posttest negative difference of -3.53. One explanation for the negative mean difference of the control group may be attributed to the difference in difficulty between the two test forms. Scores on Form A of the WGCTA are typically 6 or 7 points lower than on Form B. This difference was controlled for by insuring that half of the subjects were given form A for the pretest and the other half were given form B. Each participant

received the opposite test form on the posttest. Since the experimenter had to rely on other people to administer the test, it is possible that more controls took Form A on the posttest and thus scored lower. Given the differences in the difficulty between the two forms of the testing instrument, the relative difference is all that is important so long as each subject takes both tests during the experimental period. It is important to note that the debate groups outscored the controls independently on the pretest, on the posttest, and on the difference between the pretest and the posttest.

Do CEDA Debaters Outperform NDT Debaters?

An analysis of covariance tested for differences on the WGCTA between CEDA and NDT groups on the posttest with the pretest serving as the covariate. Those debaters with NDT and CEDA debate experience were eliminated from the data prior to statistical analysis. The results are reported in Table 2. The main effects variation produced a F value of 21.88 which was significant at the .001 level; thus, null hypothesis two was rejected.

Do CEDA Debaters Outperform Nondebaters?

When examinined as a discrete varaiable, the CEDA group produced a higher mean average than the control group on the WGCTA. CEDA debaters out scored nondebaters by a mean of 10 on the pretest, 14.39 on the posttest, and scored a mean difference of 4.39. These figures suggest CEDA debaters scored higher than nondebaters during the experimental period.

An analysis of covariance revealed that the difference between CEDA debaters and nondebaters was statistically significant. Table 2 reports these results. The main effects variation produced an F value of 5.368 which was significant at the .005 level; therefore, null

hypothesis three was rejected.

Do NDT Debaters Outperform Nondebaters?

When examined as a discrete variable, the NDT debaters also produced a higher mean average than their nondebating counterparts. NDT debaters outscored the controls by a mean of 10.82 on the pretest and 18.77 on the posttest for a mean difference from the pretest to the posttest of 7.95.

Table 2 gives the results of analysis of covariance conducted to test the significance of these differences between NDT debaters and nondebaters. The main effects variation between NDT debaters and nondebaters produced a f value of 31.77 which was significant at the .001 level; therefore, null hypothesis four was rejected.

DISCUSSION

This study was conducted to determine whether intercollegiate debating enhances the critical thinking ability of participants and to investigate whether the two existing styles (NDT and CEDA) differed significantly from each other and from nondebaters in their relation to critical thinking. The five abilities of critical thinking measured were inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments.

The hypothesis that debaters and nondebaters do not perform differently to a significant degree on critical thinking tests is rejected by the data in this study. These results constitute preliminary proof that some criticisms of the educational benefits of college debating are unwarranted if critical thinking ability is used as a criterion. (Replication of these results with larger samples are later needed to firmly establish a case for contemporary debate

practices, however). The findings that debaters' critical thinking test scores are significantly higher then those of nondebaters is consistent with the majority of previous research cited in this study.

The second hypothesis suggested the effects of CEDA and NDT debate do not differ significantly in terms of critical thinking scores. The data from this study supported rejection of this hypothesis leaving the alternative hypothesis that CEDA and NDT do differ significantly in critical thinking test scores. While this study's data suggest that NDT and CEDA debate training produce different gains in critical thinking scores over the experimental period, the conclusion should only be considered tentative. The experimental group identified as NDT was sufficiently large to exceed the sample size estimate; the experimental group labeled CEDA was not large enough. Many CEDA debaters had previous NDT debate experience and were excluded from the final analysis as it was not appropriate to compare these two styles using CEDA debaters who had previous NDT training. One can argue that the sample size estimate of this study is highly conservative and that the analysis of covariance is a robust statistical procedure, hence the comparison may be considered valid; however, choosing between CEDA or NDT debate training on the basis of this data alone is not warranted. This research rejects the hypothesis that CEDA and NDT are not significantly different in terms critical thinking scores, but makes no claim to predict which is significantly better.

It is important to note that caution should exercised when attempting to make inferences about this data. Nie, Hull, Jenkins, Steinbrenner and Bent (1975) note:

> The stronger the association (positive) between [independent variable one] and [independent variable two], the greater will be the discrepancy between the joint additive effect and the sum of

> the main effects. . . [I]n the orthogonal design, if the joint additive effect is significant, at least one of the main effects will be significant. In the classic approach, if the association between the factors is strong and positive, it is possible that none of the factors are significant although the joint effect is (p. 408).

Because of this "joint additive effect," the sums of squares for the main effects in this study did not always equal the sums of squares for the independent varaibles. This was controlled for by conducting an individual analysis of covariance for each independent variable. However, caution is still advised when generalizing any of the inferential procedures used in this experiment. Future researchers may wish to consider multiple classification analysis when attempting similar studies.

The third and fourth null hypotheses were also rejected. Both CEDA and NDT trained debaters independently outscored the nondebaters on the critical thinking tests. This finding was true for the pretest, for the posttest, and for difference between pretest and posttest. The difference was significant for both the third and fourth hypotheses. These findings suggest both types of contemporary debate training are beneficial if critical thinking scores are used to measure educational benefits of debating.

CONCLUSIONS

This study has focused on the relationship between debate training and critical thinking ability. A number of other benefits come from participating in debate, such as, improvement of communication, organizational, and research skills. Inferences drawn from this data should only be applied to the aspect of critical thinking ability.

Although all four null hypotheses were rejected, caution is advised in interpreting these findings. By attempting to observe

actual debate training at several universities, it was not possible to randomly assign individuals to experimental and control groups. In other words, the results are based on information from intact groups. Additionally, no proof is provided which determines if the debate activity enhanced the critical thinking ability of those who choose to debate or if those who choose to debate are already strong in critical thinking. Using the pretest scores as the covariate and measuring the difference in critical thinking gains during the experimental period statistically controls for interaction variables. While this process helps to remove some doubts, it cannot account for all factors which may influence some students to debate and others not. One cannot isolate one variable in a student's academic career and claim that one aspect of the student's education is solely responsible. This shortcoming may be applied to many of the analytical approaches in the behavioral sciences. However, when viewed from a broader perspective, then one may conclude this data is consistent with previous findings and provides direction for future research.

This research suggests debaters outscore nondebaters on the WGCTA and that CEDA and NDT differ on this instrument. Future research should investigate why these differences exist emphasizing specific instructional strategies and behavioral demands of both debating styles.

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TABLE 1

Mean Comparisons Between
Between Debaters and NonDebaters on the
Watson-Glaser Critical Thinking Appraisal

WGCTA*	PRETEST	POSTTEST	PRE-POST DIFFERENCE
NONDEBATERS	52.67	49.14	-3.53
CEDA DEBATERS**	62.67	63.53	.87
NDT DEBATERS***	63.49	67.91	4.42
ALL DEBATERS	61.18	64.53	3.35
TOTAL SAMPLE	55.51	53.65	1.86

N = 285 Males = 145 Females = 130

* The Watson-Glaser Critical Thinking Appraisal

** The Cross Examination Debate Association

*** The National Debate Tournament

TABLE 2

Analysis of Covariance of Differences Between Debaters & Nondebaters, CEDA & NDT Debaters, CEDA & NonDebaters, and NDT & Nondebaters on WGCTA

DEBATERS & NONDEBATERS	DF	F	Sign. of F
MAIN EFFECTS	2	28.21	.001
DEBATER/ NONDEBATER	1	45.22	.001
PRETEST (COVAR)	1	2.64	.106

CEDA & NDT DEBATERS	DF	F	Sign. of F
MAIN EFFECTS	3	21.88	.001
NDT	1	52.97	.001
CEDA	1	2.05	.154
PRETEST (COVAR)	1	2.57	.109

CEDA & NONDEBATERS	DF	F	Sign. of F
MAIN EFFECTS	2	5.37	.005
CEDA	1	1.05	.307
PRETEST (COVAR)	1	8.41	.004

NDT & NONDEBATERS	DF	F	Sign. of F
MAIN EFFECTS	2	31.77	.001
NDT	1	52.11	.001
PRETEST (COVAR)	1	3.53	.061